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Intelligent Automation Incorporated

Coherent distributed radar for high-resolution through-wall imaging

Progress Report 17

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Summary

In this period of performance, we are continuing to develop the hardware, and software for the final demonstration.

1.0 INTRODUCTION

In this report we discuss progress in radar design, software design, and simulations

1.1 Hardware build up

During this period we have ordered all hardware components, and PCBs to finish the final demonstration hardware.

1.2 Simulations

We are performing simulations to study use of wireless synchronization to improve ranging accuracy in the presence of multipath. Specifically, we are simulating RF ranging in a corridor, where the transmitter and receiver are located at the opposite ends of a 10m long, 5m wide corridor. The receiver moves across a 4m aperture, while recording waveforms. We use a Physic Optics (PO) model to calculate multipath scattering from wall. The LFM waveform has 50MHz of bandwidth @ UHF, and we assume 10dB SNR.

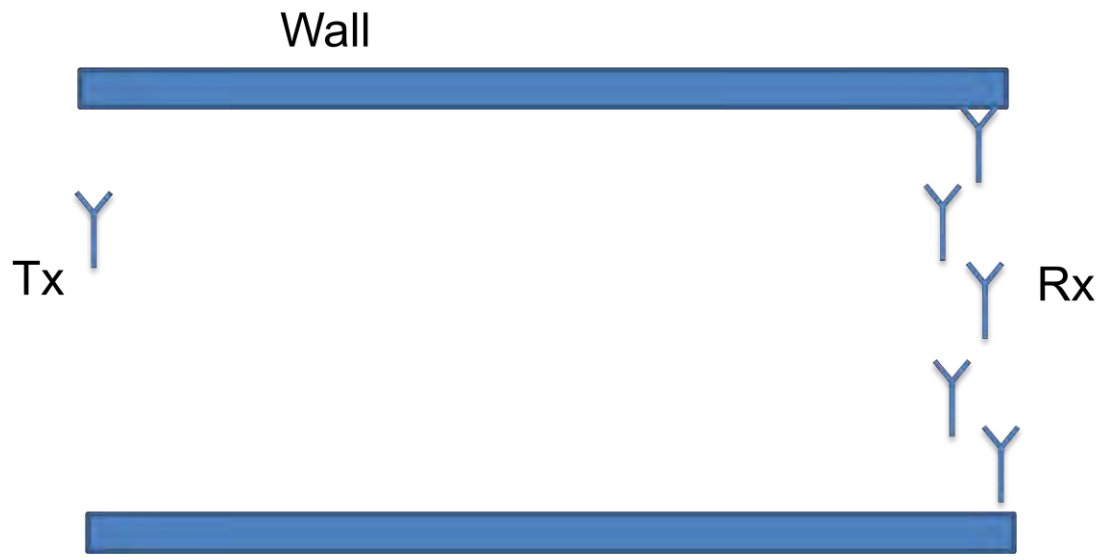

Figure 1. RF ranging in corridor.

We show the received RF signal with and without beamforming in the figure below.

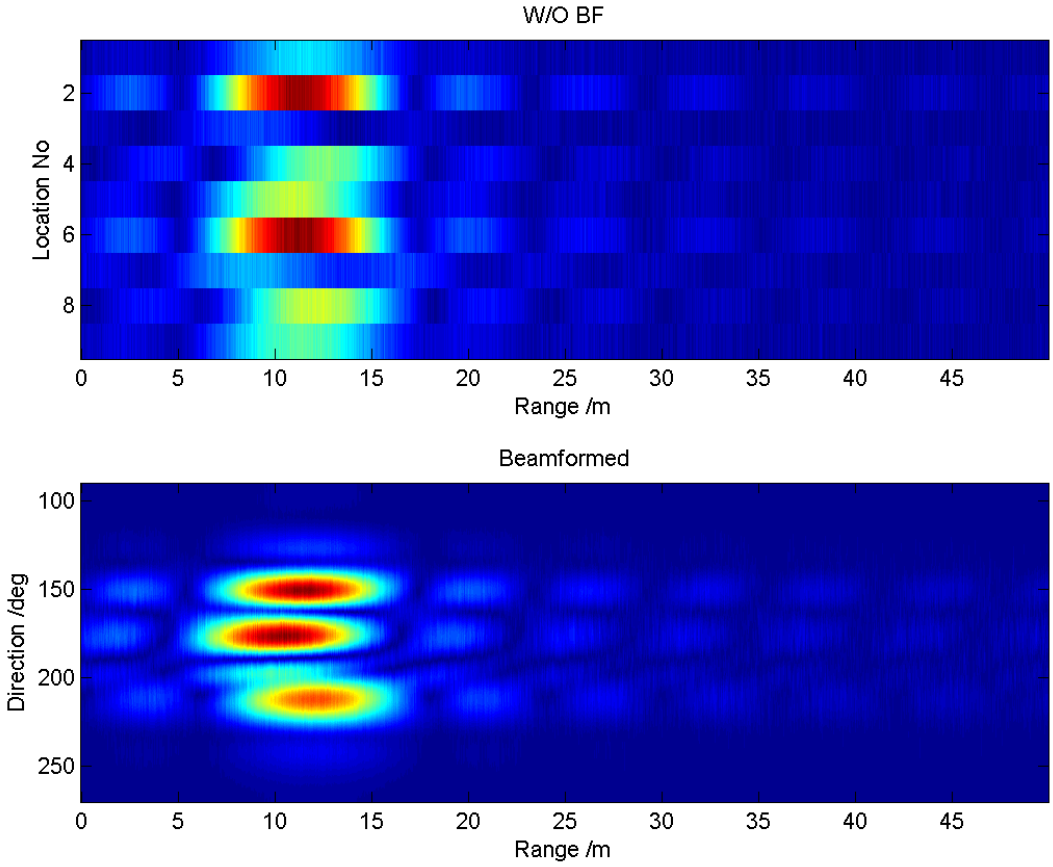

Figure 2. Top: Received signal w/o beam forming. Bottom: with beamforming.

Note that after beamforming, the Line Of Sigh (LOS) and multipath can clearly be distinguished.

This forms the basis for the expected improved ranging performance using beamforming.